WHAT IS CLAIMED IS:

1. A method to increase effective differential dynamic range for a differential pixel detector exposed to optical energy having a common mode component, the differential pixel detector including a first photodetector and an associated first capacitor, and a second photodetector and an associated second capacitor, the method comprising:

(a) at start of an integration time T, resetting voltage on each said capacitor to a fixed reference voltage;

(b) during said integration time T, directly integrating photocurrent generated by said first photodetector in said first capacitor, and directly integrating photocurrent generated by said second photodetector in said second capacitor;

(c) within said integration time T, before voltage developed across either said first capacitor or said second capacitor attains a saturation voltage V_{sat} associated with said differential pixel detector resetting the developed voltage on said capacitor such that a desired differential pixel detector signal is still determinable.

2. The method of claim 1 wherein step (c) includes resetting with a reset signal generated external to the different pixel detector.

3. The method of claim 1 wherein step (c) includes resetting with a reset signal generated automatically inside the pixel when voltage developed on either said first capacitor or said second capacitor attains a voltage approaching said saturation voltage.

4. The method of claim 1, wherein step (c) includes resetting said developed voltage on said capacitor to a voltage V_{ref}.

5. The method of claim 4, further including sensing voltage developed across each said capacitor to reset voltage developed on each said capacitor to said V_{ref}.

6. The method of claim 5, wherein the voltage developed across each of said capacitor is reset in a manner selected from a group consisting of (i) simultaneously and (ii) independently.

7. The method of claim 1, wherein step (c) includes resetting said developed voltage on said capacitor to a voltage V_{ref};

further including a step of counting number of resets of voltage developed across said capacitor during said integration time T;

wherein effective dynamic range of the associated said photodetector is $n \bullet (V_{ref} - V_{sat}) + V_{final}$, where n is said number of resets, and V_{final} is voltage on said capacitor at end of integration time T.

8. The method of claim 7, further including using an analog counter to sense said number of resets.

9. The method of claim 1, wherein said first capacitor is parasitic capacitance associated with said first photodetector, and said second capacitor is parasitic capacitance associated with said second photodetector; further including:

providing a third capacitor switchably coupleable in parallel with said first capacitor, and providing a fourth capacitor switchably coupleable in parallel with said second capacitor;

switchably decoupling said third capacitor from said first photodetector, and switchably decoupling said fourth capacitor from said second photodetector;

switchably inverting and coupling together in parallel said third capacitor and said fourth capacitor such that accumulated charge

redistributes therebetween such that a common mode component is substantially reduced;

wherein said desired differential pixel detector signal is still determinable and each reset bring common mode magnitude closer to a voltage V_{ref}.

10. The method of claim 1, wherein each said photodetector is selected from a group consisting of a photodiode and a photogate.

11. The method of claim 1, further including controllably injecting a fixed amount of charge into said first capacitor and said second capacitor such that potential on each capacitor is moved away from a potential approaching V_{sat};

wherein said desired differential pixel detector signal is still determinable while common mode is suppressed to prevent saturation.

12. The method of claim 11, wherein said fixed amount of charge is injected by switchably coupling outputs from two matched constant current sources to said first capacitor and said second capacitor.

13. The method of claim 11, wherein said amount of charge is injected by switchably coupling outputs from small high voltage charged capacitors to said first capacitor and said second capacitor, respectively.

14. The method of claim 11, wherein said fixed amount of charge is injected from outputs of pulsed matched constant current sources whose current outputs are coupled to said first capacitor and said second capacitor.

15. A differential pixel detector responsive to optical energy having a common mode component, comprising:

a first photodetector and an associated first capacitor that directly integrates photocurrent generated by said first photodetector during an integration time T;

a second photodetector and an associated second capacitor that directly integrates photocurrent generated by said second photodetector during said integration time T;

means for forcing potential on each said capacitor to a fixed voltage potential before start of said integration time T; and

means for resetting potential on either capacitor during said integration time T before said potential attains a saturation voltage V_{sat} associated with said differential pixel detector such that a desired differential pixel detector signal is still determinable.

16. The pixel of claim 15, wherein said means for resetting is triggerable from an external signal.

17. The pixel of claim 15, further including means for detecting when voltage developed on one of said first capacitor or said second capacitor attains a magnitude approaching said saturation voltage V_{sat}.

18. The differential pixel detector of claim 15, wherein said means for forcing includes a first switch coupled between a source of a fixed voltage V_{ref} potential and said first capacitor, and a second switch coupled between said source and said second capacitor.

19. The differential pixel detector of claim 18, further including:

a differential comparator having a first input coupled to said first capacitor and a second input coupled to said second capacitor and outputting a differential signal proportional to a difference between signals at said first input and said second input; and

a resettable charge pump coupled to receive said differential signal output from said differential comparator and to be reset when each said first capacitor and said second capacitor are reset;

wherein an output from said resettable charge pump is a stored accumulation of voltage differentials between said first photodetector and said second photodetector.

20. The differential pixel detector of claim 15, wherein said means for resetting resets said potential to a voltage V_{ref}.

21. The differential pixel detector of claim 15, further including a first counter to count number of resets of potential across said first capacitor during said integration time T;

wherein effective dynamic range of the associated said photodetector is $n \cdot (V_{ref} - V_{sat}) + V_{final}$, where n is said number of resets, V_{ref} is a reset voltage and V_{final} is voltage on said first capacitor at end of integration time T.

22. The differential pixel detector of claim 21, wherein said first counter is selected from a group consisting of (a) a digital counter, and (b) an analog counter.

23. The differential pixel detector of claim 15, wherein said first capacitor is parasitic capacitance associated with said first photodetector, and said second capacitor is parasitic capacitance associated with said second photodetector, said differential pixel detector further including:

a third capacitor switchably coupleable in parallel with said first capacitor, and a fourth capacitor switchably coupleable in parallel with said second capacitor;

means for switchably decoupling said third capacitor from said first photodetector, and switchably decoupling said fourth capacitor from said second photodetector;

means for switchably inverting and coupling together in parallel said third capacitor and said fourth capacitor such that accumulated charge redistributes therebetween such that a common mode component is substantially reduced;

wherein said desired differential pixel detector signal is still determinable and each reset brings common mode magnitude closer to a voltage V_{ref}.

24. The differential pixel detector of claim 15, further including:

means for complementarily switchingly coupling each lead of said first capacitor to a source of fixed potential V_{ref}, and complementarily switchingly coupling each lead of said second capacitor to said source of fixed potential V_{ref};

a resettable integrator, switchably integrating a potential present at each lead of each said capacitor;

wherein integration provides an output proportional to differential signal present at said first photodetector and said second photodetector while canceling common mode component including KT/C noise substantially independently of matching of components in said differential pixel detector.

25. The differential pixel detector of claim 15, further including:

a mirrored current source to inject a fixed amount of charge into said first capacitor and into said second capacitor such that potential on each capacitor is moved away from a potential approaching V_{sat};

wherein desired differential pixel detector signal is still determinable while common mode is suppressed to prevent saturation;

said mirrored current source selected from a group consisting of (a) a constant current source whose matched outputs are switchably coupled to said first capacitor and said second capacitor, and (b) a pulsed matched constant current source whose current outputs are coupled to said first capacitor and said second capacitor.

26. The differential pixel detector of claim 15, further including:

small high voltage capacitors to inject an amount of charge into said first capacitor and into said second capacitor such that potential on each capacitor is moved away from a potential approaching V_{sat};

wherein said desired differential pixel detector signal is still determinable while common mode is suppressed to prevent saturation.

27. The differential pixel detector of claim 15, wherein each said photodetector is selected from a group consisting of a photodiode and a photogate.